

May 9, 2003

Reply to Office Action of December 9, 2002

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (currently amended) A method for preparing a rare earth permanent magnet to be exposed to a refrigerant and/or lubricant for an extended period of time, comprising the steps of:

casting an alloy based on R, T and B, wherein R is neodymium or a combination of neodymium with one or more rare earth elements, T is iron or a mixture of iron and cobalt, and B is boron, said alloy consisting essentially of 17 to 33.5% by weight of neodymium, 26.8 to 33.5% by weight of the entire R, 0.78 to 1.25% by weight of B, 0.05 to 3.5% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mn, Sn, Mo, Zn, Pb, Sb, Al, Si, V, Cr, Ti, Cu, Ca and Mg, the balance being T and incidental impurities,

crushing the alloy in an oxygen-free atmosphere of argon, nitrogen or vacuum, followed by comminution, compacting under a magnetic field, sintering and aging, thereby yielding a sintered magnet having an oxygen concentration of up to 0.8% by weight, and magnetic properties including a residual flux density Br of 12.0 to 15.2 kG and a coercive force iHc of 9 to 35 kOe,

cutting and/or polishing the sintered magnet to give a sintered magnet with a finished surface, and

heat treating the sintered magnet with a finished surface in an argon, nitrogen or low-pressure vacuum atmosphere having an oxygen partial pressure of 10^{-6} to 10^0 torr for 10 minutes to 10 hours at a temperature of 200 to 1,100°C.

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2. (currently amended) A method for preparing a rare earth permanent magnet to be exposed to a refrigerant and/or lubricant for an extended period of time, comprising the steps of:

furnishing a mother alloy based on R, T and B, wherein R is neodymium or a combination of neodymium with one or more rare earth elements, T is iron or a mixture of iron and cobalt, and B is boron, said mother alloy consisting essentially of 17 to 33.5% by weight of neodymium, 26.8 to 33.5% by weight of the entire R, 0.78 to 1.25% by weight of B, 0.05 to 3.5% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mn, Sn, Mo, Zn, Pb, Sb, Al, Si, V, Cr, Ti, Cu, Ca and Mg, the balance being T and incidental impurities, and an auxiliary alloy consisting essentially of 28 to 70% by weight of R' wherein R' is at least one rare earth element, 0 to 1.5% by weight of B, 0.05 to 10% by weight of at least one element selected from the group consisting of Ni, Ga, Zr, Nb, Hf, Ta, Mo, Al, Si, V, Cr, Ti and Cu, the balance being a mixture of iron and cobalt and incidental impurities,

hydriding and crushing the mother alloy in an oxygen-free atmosphere of argon, nitrogen or vacuum,

mixing 85 to 99% by weight of the crushed mother alloy with 1 to 15% by weight of the auxiliary alloy, followed by comminution, compacting under a magnetic field, sintering and aging, thereby yielding a sintered magnet having an oxygen concentration of up to 0.8% by weight, and magnetic properties including a residual flux density Br of 12.0 to 15.2 kG and a coercive force iHc of 9 to 35 kOe,

cutting and/or polishing the magnet to give a sintered magnet with a finished surface, and

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heat treating the sintered magnet with a finished surface in an argon, nitrogen or low-pressure vacuum atmosphere having an oxygen partial pressure of 10^{-6} to 10^0 torr for 10 minutes to 10 hours at a temperature of 200 to 1,100°C.

3. **(original)** The method of claim 1 wherein the sintered magnet has an oxygen concentration of 0.05 to 0.8% by weight and a carbon concentration of 0.03 to 0.10% by weight.

Claims 4 and 5 (previously canceled)

6. **(previously added)** The method of claim 2 wherein the sintered magnet has an oxygen concentration of 0.05 to 0.8% by weight and a carbon concentration of 0.03 to 0.10% by weight.

7. **(previously added)** The method of claim 1 wherein the heat treatment is effected at a temperature of 300 to 600°C.

8. **(previously added)** The method of claim 2 wherein the heat treatment is effected at a temperature of 300 to 600°C.

9. **(previously added)** A high efficiency motor comprising a rare earth permanent magnet prepared by the method of claim 1.

10. **(previously added)** A high efficiency motor comprising a rare earth permanent magnet prepared by the method of claim 2.

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11. (previously added) The method of claim 1, wherein the content of cobalt in T, if present, is 20% by weight or less based on the total weight of iron and cobalt.

12. (previously added) The method of claim 2, wherein the content of cobalt in T, if present, is 20% by weight or less based on the total weight of iron and cobalt.

13. (previously added) The method of claim 1, wherein the comminution is to a mean particle size of about 1 to 30 μm .

14. (previously added) The method of claim 2, wherein the comminution is to a mean particle size of about 1 to 30 μm .

15. (previously added) A rare earth permanent magnet prepared by the method of claim 1, which has suboxides on its surface formed during the heat treating step.

16. (previously added) A rare earth permanent magnet prepared by the method of claim 2, which has suboxides on its surface formed during the heat treating step.

17. (currently amended) The method of claim 1, wherein the heat treating is conducted in an argon and/or or nitrogen atmosphere having an oxygen partial pressure of 10^{-6} to 10^0 torr.

18. (currently amended) The method of claim 2, wherein the heat treating is conducted in an argon and/or or nitrogen atmosphere having an oxygen partial pressure of 10^{-6} to 10^0 torr.

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